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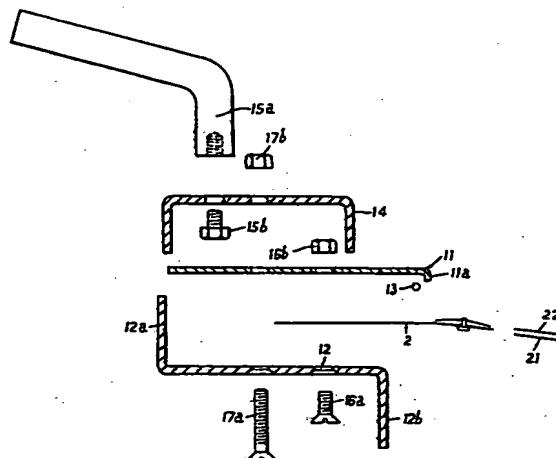
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### ㉚ Doctor blades.

㉛ A composite doctor blade assembly includes a length of steel strip 21, forming the doctor blade, and a similar but narrower back-up blade 22. The strips 21, 22 are clamped between a resiliently flexible carrier strip 23 and an arched resilient strip 24 held together under tension by ties 25 passing through apertures 23a, 24a. To make the blade assembly longitudinally flexible, the apertures are elongated.

The plate 23 is clamped in a holder between an intermediate element 11 and a bottom element 12 with the interposition of an interchangeable cylindrical packing element 13. The top element 14 is channel shaped to provide extra rigidity.



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#### DOCTOR BLADES

The present invention relates to doctor blades, more particularly but not exclusively for stripping excess ink from a rotating printing roll in the surface of which there are arranged depressions for filling with printing ink. The doctor blade is attached to a holder carried by an adjustable apparatus which determines the force with which the doctoring edge of the blade lies against the printing roll. Such blades are exposed to wear and must be changed after a period of use.

A conventional doctor blade consists of a strip which is formed along its length with a thinner forward portion and a thicker rear portion. The thinner forward portion is formed by a comparatively expensive grinding operation.

The free edge of the thinner portion is intended for use as a stripping edge, while the thicker portion is intended for clamping in a standard type of blade holder for the printing machinery in question. The advantage of the thin portion of even thickness is that wear on it can take place without the wear causing any unacceptable alteration of the profile of the scraping or doctoring edge engaging the printing roll.

In long printing runs, the blade may have to be removed, either for replacement due to wear or for cleaning. When changing blades, the blade is removed together with a relatively heavy removable portion of the standard holder and is carried to a place for changing the blade or to a hot steam bath in which the blade is to be cleaned. This work is often arduous, since the weight of the removable holder and the blade attached thereto is considerable, and the walking distance in the printing hall to the work bench or to the steam bath is in many cases so long that the holder portion with the blade needs to be transported on a trolley.

British patent specification No. 1507825 discloses the use of a replaceable strip as doctor blade. The strip is clamped in a doctor blade holder which is, close to the strip itself, relatively stiff lengthwise.

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Such a holder cannot fully support the doctor blade strip in its effort to maintain even pressure between the doctor blade edge and the printing cylinder. As a result the print quality and the doctor blade life will be low.

US patent specification No. 2007418 also discloses a doctor blade holding assembly for a strip, this holding assembly also being relatively stiff lengthwise with disadvantages. The device is designed for negative doctoring, ie. scraping the roll, consequently without special requirements a doctor blade for a printing roll.

The invention is defined in the claims.

A preferred embodiment of the invention will now be described by way of example with reference to the accompanying drawings, in which:

Fig. 1 is a perspective view of a complete doctor blade and holder,

Fig. 2 is an exploded view in cross section, through the complete holder shown in Fig. 1.

Fig. 3 is an exploded view in cross section, of the flexible doctor blade sub-assembly..

Fig. 4 is a view in cross section of the flexible blade sub-assembly when assembled.

Fig. 5 is a fragmentary plan view of one end of the flexible blade sub-assembly.

Fig. 6 is a schematic perspective view of the blade sub-assembly showing the lengthwise flexibility of the sub-assembly.

Figs. 7, 9 and 11 are plan views of alternative presser plates, and

Figs. 8, 10 and 12 are respective cross sections on the lines VIII, X and XII of Figs. 7, 9 and 11.

Figures 1 and 2 show a doctor blade assembly consisting of a flexible doctor blade sub-assembly 2 including the doctor knife blade 21 with its back up blade 22 and a light-weight rigid holder 1.

As shown in Fig. 1 and 2 the light-weight doctor blade holder 1 consists of three sheet-metal elements of different cross sections, each accurately straight. The bottom element 12 is formed like a Z and has an upstanding rear flange 12a and a depending front flange 12b. The middle element 11 is formed as an L having a small depending front flange 11a. The top element 14 formed like an inverted U having depending front and rear flanges 14a and 14b. The middle element 11 is clamped to the bottom member 12 by a row of bolts 16a having corresponding nuts 16b. Between the middle element 11 and the bottom element 12 is the clamped flexible sub-assembly, normally permanently To give the middle member 11 an accurate

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and straight edge to support the springy flexible blade sub-assembly 2 a metal rod or tube 13 is positioned in the corner of the middle element. A range of rods or tubes 13 may be made available of different diameters to enable the pressure of blade application to be adjusted. The top member 14 completes the holder 110 by giving it stiffness, straightness and a convenient overall thickness corresponding to the thickness of the conventional, heavy solid metal holder which the holder replaces. The top member 10 is clamped to the other two members 11, 12 by means of say four or six bolts 17a with corresponding nuts 17b along the length of the holder. The heads of bolts 17a and 17b are counter-sunk into the bottom member 12 so that the bolt heads lie flush with the bottom surface of the bottom member 12. This surface is directed towards the doctor blade holder bed in the printing press unit which is a straight plane parallel to the printing cylinder axis demanding an accurate and plane surface of the doctor blade holder.

The holder is preferably provided with two handles 15a fixed to the second holder by means of bolts 15b passing through the top member 14.

The doctor blade 21 is a length of thin, steel strip cut from stock of uniform thickness and is supported by a back-up strip 22 which also is a thin steel strip of uniform thickness but narrower than the doctor blade 21. Both blades are resiliently clamped, as shown in Fig. 4 in the flexible sub-assembly. This consists of a wider flexible carrier plate 23, which is clampable or fixable in the holder 1 or in a conventional solid metal holder, and a narrower flexible presser plate 24, which is disposed with its front edge almost flush with the front edge of the sider plate 23. Both plates 23, 24 are of spring steel 0.3mm thick (or less). As shown in Fig. 3 the arched narrower plate 24 is transversely curved but can also be bent to a corresponding degree, thus comprising two flat portions at an obtuse angle to each other. The plates 24, 23 are held in position by a plurality of ties 25 arranged in a straight row, and each having a flange 25a at one end in the shape of a bolt head and a groove 25b near the other end to receive a circlip 26.

The free length between the two clamping surfaces presented respectively by the flange 25a and the circlip 26 is substantially greater than the combined thickness of the plates 24, 23 and the blades 22, 21.

This free length of the ties and the curvature of the narrower presser plate 24 are so selected relative to each other that the desired clamping pressure is obtained between the front edge portions of the plates 24, 23.

The elongated holes 24a, 23a of the plates 24, 23 through which the

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ties 25 pass accurately fit the ties 25 transversely and lie with their extended longer dimensions in a straight row parallel to the edges of the plate 23. This permits convenient insertion of the blades 22, 21 to an accurately determined position by first the back-up blade 22 being inserted up to engagement with the ties 25 and then the doctor blade 21 being inserted up to engagement with the ties 25, which thus also serve as stops for the two blades 22, 21.

The doctor blade 21 consists of a thin, steel strip of constant thickness and width, the thickness of the strip being in the range 0.05 - 0.15 mm. The thickness of the doctor blade is thus so small that the blade 21 can be curved in the plane of Fig. 5, the right hand side of the blade being then wrinkled, enabling the blade to be drawn progressively out from or pressed progressively between the plates 24, 23 along the length of the blade, from one end to the other with the aid of a rag.

The back-up blade 22 is normally identical to the doctor blade 21 except for the width which is 1 to 2 mm less than the width of the doctor blade.

Since the doctor blade and the back-up blade consist of thin steel strips; the doctor blade supported by the back-up blade can easily adjust itself to unevenesses on the printing cylinder, and this adjusting capacity is further substantially increased by the two blades being resiliently clamped in the flexible sub-assembly. The flexibility of this sub-assembly is shown in Fig. 6, from which it is clear that the front edge of the flexible sub-assembly 2 has a flexing capacity both lengthwise and cross-wise relative to a straight reference line R - R when the holder is fixed straight and stiffly along a line F - F and to the left of this line. This flexibility lengthwise directly results from the elongated holes 23a, 24a, these holes being extended at least 30 percent along the hole-row-axis, both in the wider plate 23 and in narrower plate 24. These holes allow the two plates 23, 24 to slide relatively to one and other when the blade flexes lengthwise, as can be seen in Fig. 6.

The flexible sub-assembly and the doctor blade 21 have a slightly greater length than the printing cylinder, so that the blade covers the entire length of the printing cylinder. The back-up blade 22 however may be slightly shorter than the doctor blade as shown in Fig. 5, so that the doctor blade 21 itself can be easily and separately gripped at one end when changing blades.

As shown in Figs. 7 and 8 the presser plate means can alternatively consist of a row of separate sections 124, each having one or more elongated

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aperture 24a, replacing the single presser plate 24. Alternatively the presser plate 24 can on the other hand be notched or slotted transversely as shown in Figs. 9 and 10 and Figs. 11 and 12 respectively to increase the lengthwise flexibility of the presser plate still more.

CLAIMS:-

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1. A doctor blade assembly comprising a resiliently flexible carrier plate, arched presser plate means extending along one edge of the carrier plate with its concave side directed towards the carrier plate, a resiliently flexible doctor blade strip of constant thickness clamped between the outer edges of the carrier plate and the presser plate means and a row of ties passing through apertures in the carrier plate and the presser plate means to hold the presser plate means in a stressed condition to clamp the doctor blade strip, the apertures in the carrier plate and a presser plate means being elongated to permit lengthwise movement of the ties relative to the carrier plate and/or the presser plate means.

2. An assembly according to claim 1, wherein the presser plate means comprises a continuous arched resilient strip.

3. An assembly according to claim 2, wherein the pressure plate strip is transversely slotted or notched.

4. An assembly according to claim 1, wherein, the pressure plate means comprises a plurality of short lengths of arched resilient strip.

5. An assembly according to any of the preceding claims wherein a resilient flexible backing strip, narrower than the doctor blade strip, is located between the presser plate means and the doctor blade strip.

6. An assembly according to any of the preceding claims wherein the ties each comprise a separate tie rod having a head at one end and a groove near the other end, the groove receiving a circlip.

7. A doctor blade assembly substantially as hereinbefore described with reference to any of the accompanying drawings.

8. A holder for a doctor blade having a plate portion to be held in the holder, the holder comprising a top, channel element having front and rear downwardly depending flanges bearing on an intermediate element in the form of a plate of width greater than the top element, and a bottom element having an upstanding rear flange behind the rear flange.

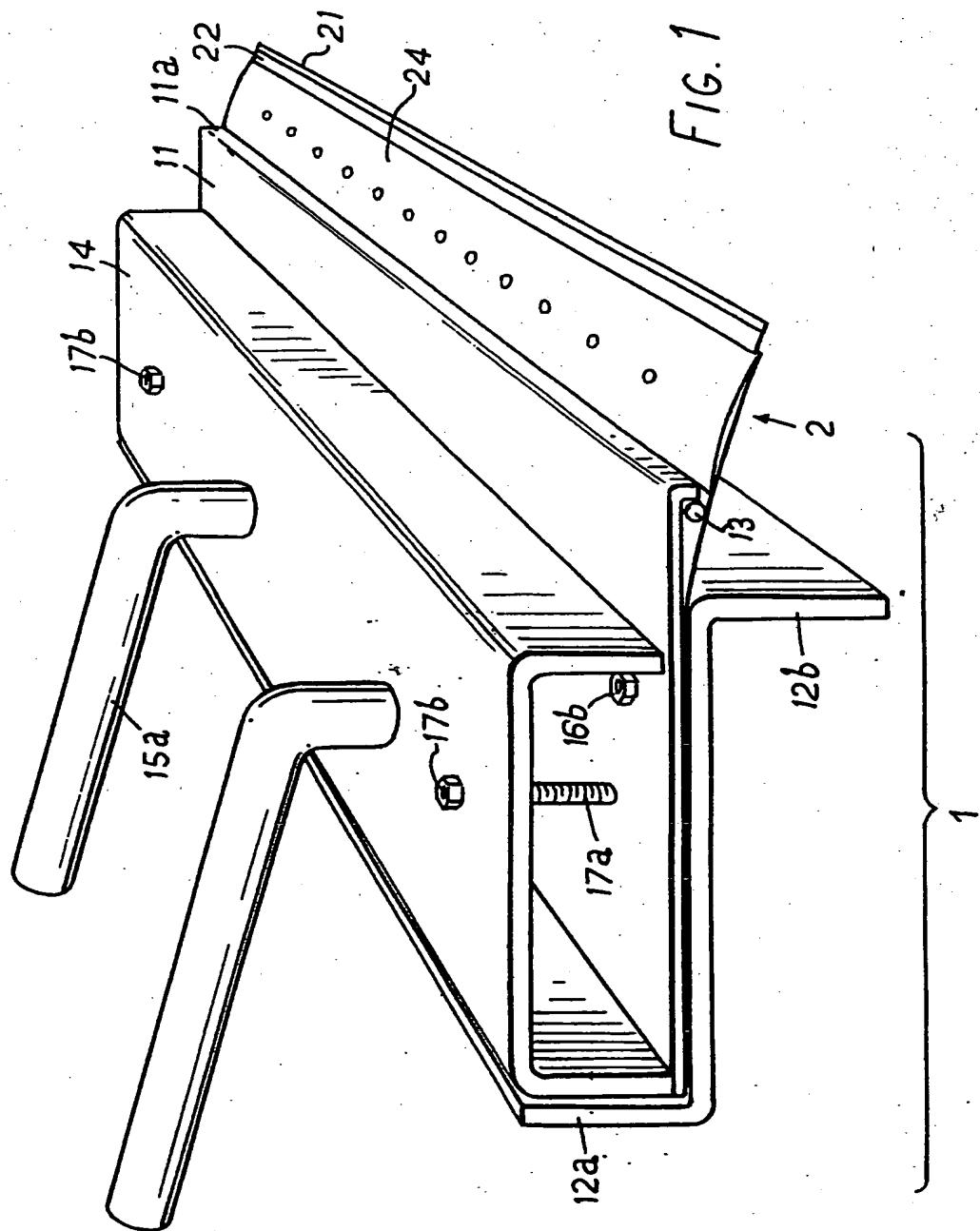
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of the top element and a depending front flange below a forward region of the intermediate element, and means for clamping the three elements together with the plate portion of the doctor blade clamped between the forward portions of the intermediate and bottom elements.

9. A holder according to claim 8, wherein the forward portion of the intermediate element has a short depending flange to form a corner to receive a cylindrical packing element whereby to adjust the positioner of a doctoring edge of the doctor blade.

10. A doctor blade holder substantially as hereinbefore described with reference to Figs 1 and 2 of the accompanying drawings.

11. A doctor blade assembly according to any of claims 1 to 7 mounted in a holder according to any of claims 8 to 10 with the carrier plate of the doctor blade assembly clamped between forward portions of the intermediate and bottom elements.



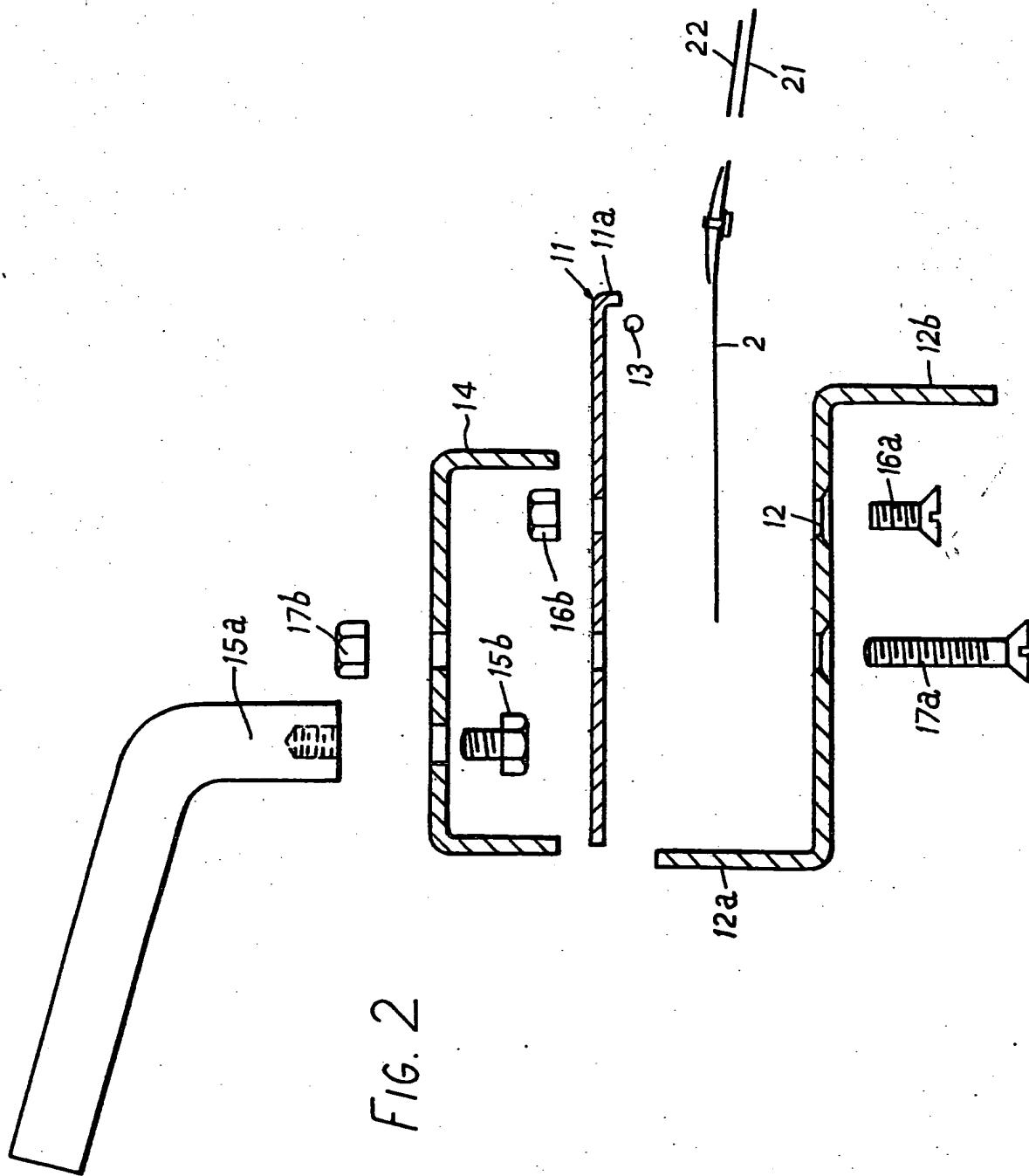


FIG. 3

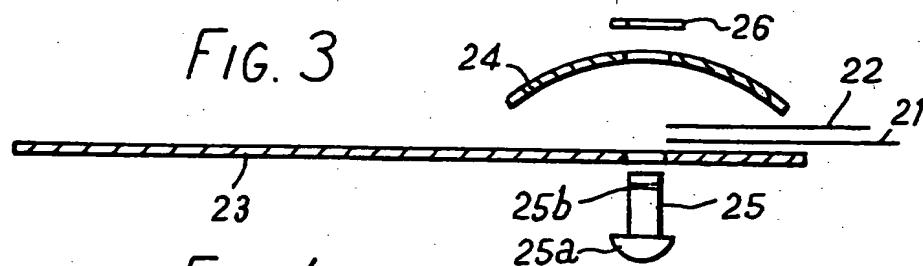
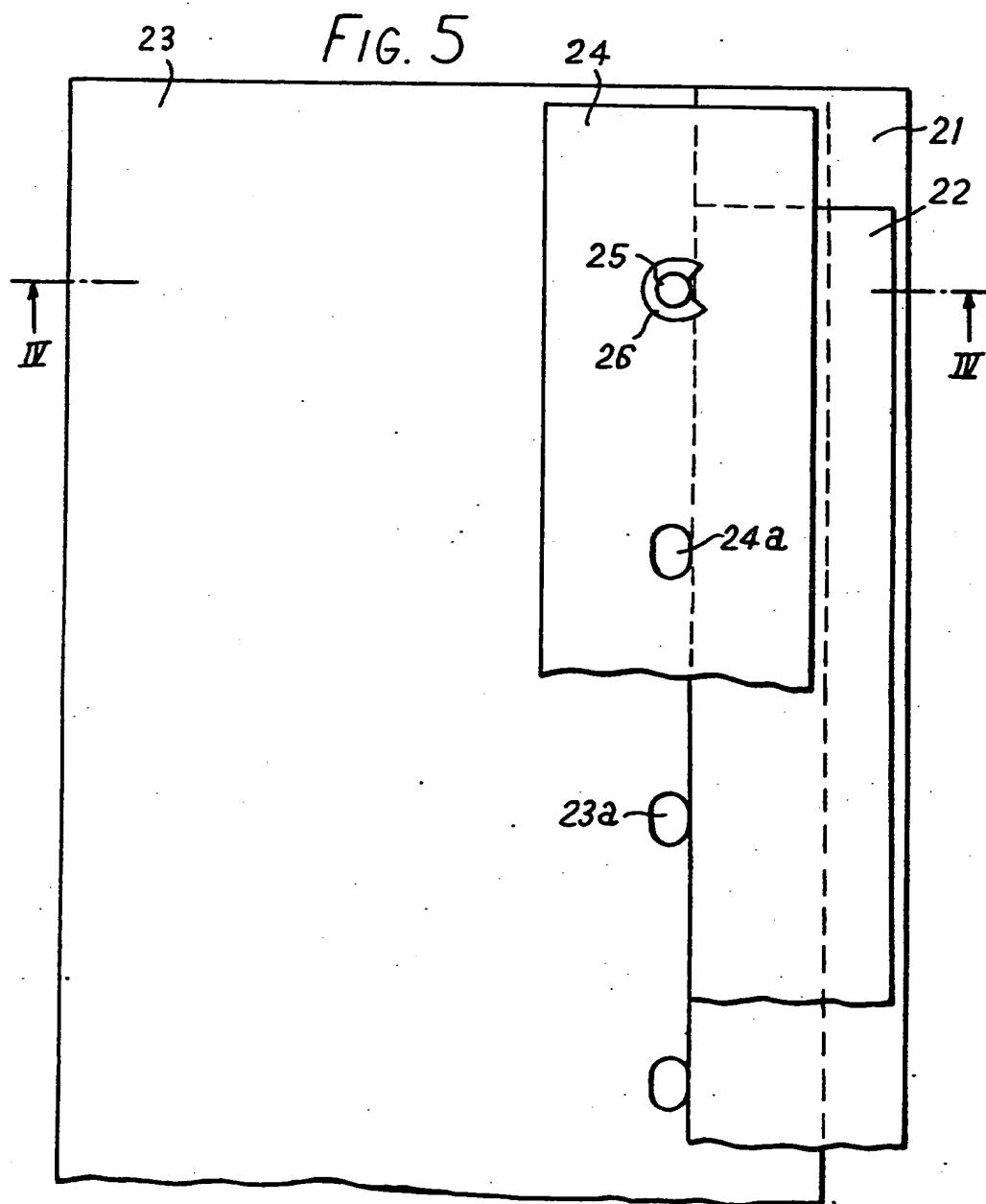


FIG. 4



23

FIG. 5



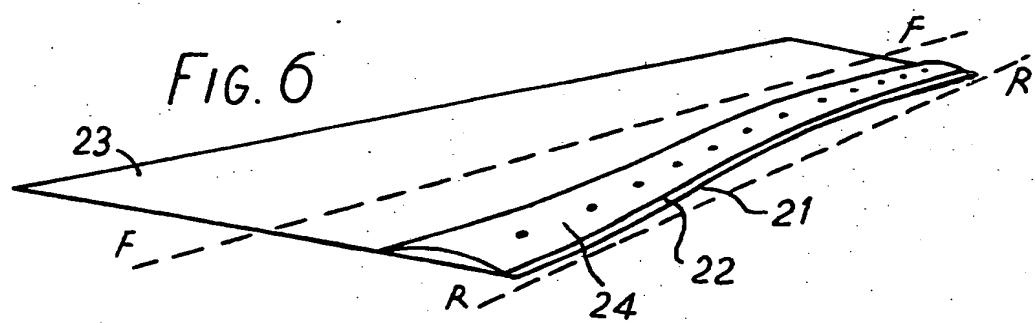


FIG. 7.

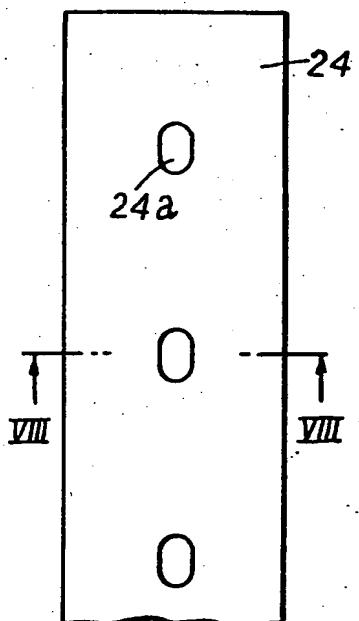


FIG. 9

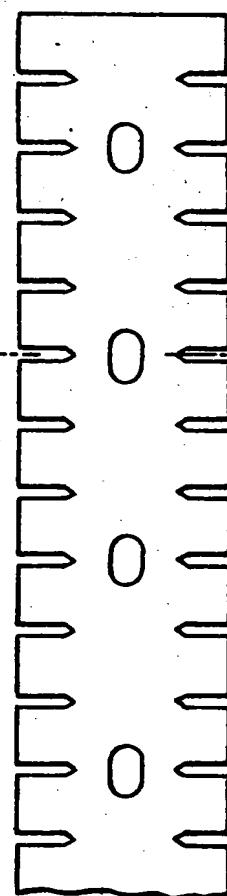


FIG. 11

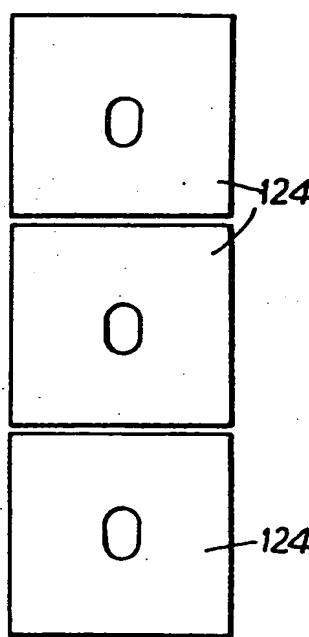
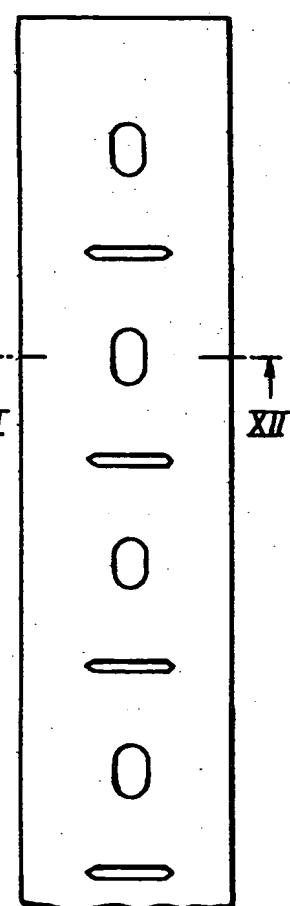
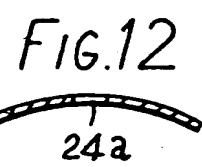
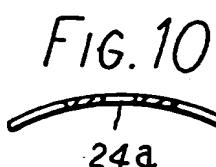


FIG. 8





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EUROPEAN SEARCH REPORT

0020106 Application number  
EP 80 30 1715

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int.Cl. <sup>2</sup> )
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
	<p><u>GB - A - 287 565</u> (AKRE)</p> <p>* Complete description *</p> <p>---</p> <p><u>US - A - 2 086 075</u> (CALICO PRINTERS)</p> <p>* Complete description *</p> <p>---</p> <p><u>DE - C - 557 556</u> (AKRE)</p> <p>* Complete description *</p> <p>----</p>	1,2,4	B 41 F 9/10
		1-3	TECHNICAL FIELDS SEARCHED (Int.Cl. <sup>2</sup> )
			B 41 F D 21 G
			CATEGORY OF CITED DOCUMENTS
			<p>X: particularly relevant</p> <p>A: technological background</p> <p>O: non-written disclosure</p> <p>P: intermediate document</p> <p>T: theory or principle underlying the invention</p> <p>E: conflicting application</p> <p>D: document cited in the application</p> <p>L: citation for other reasons</p>
			<p>&amp;: member of the same patent family, corresponding document</p>
<p><input checked="" type="checkbox"/> The present search report has been drawn up for all claims</p>			
Place of search	Date of completion of the search	Examiner	
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